# 10. Tactical Displays

## 10.1 Design of Map Windows

A map window, shown in figure 10-1, includes a menu bar, toolbar or tool palette, map area, and status bar. Users can configure the appearance of the tool and status areas as well as hide them in order to increase the size of the map. The use of tabbed pages to provide access to multiple maps in a single window is not recommended because these pages reduce the size of the map area and add unnecessary complexity to the management of map information by users.

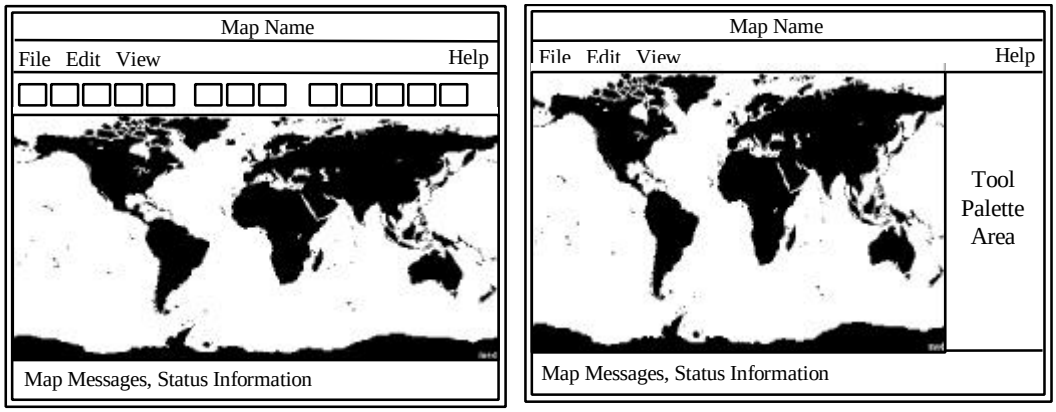


Figure 10-1. Example map windows.

Menu bar. The menu bar provides access to basic map display and manipulation functions and to application-specific map accessories (e.g., tactical decision aids, terrain analysis tools) that address mission requirements. The contents of any common menus (e.g., File, Edit) included in a map window comply with specifications in section 8.1.2. The leftmost menus in the menu bar contain options related to map display and manipulation, with any application-specific menus added to the right preceding the Help menu.

> Motif Only: All of the menus provide a tear-off capability so that users can access map functions in a menu window if they choose to do so.

Toolbar. Redundant access to frequently executed map functions is provided in a toolbar or palette area in the window itself (see figure 10-1) or in a palette contained in a separate dialog window. The toolbar is designed in accordance with specifications in section 8.1.3, with the content tailored to fit mission requirements and configurable by users.

If a toolbar is used, it is located below the menu bar (with a show/hide feature available in a View menu). If a tool palette is provided, it is placed next to or below the map area and may be a dedicated area in the window or controlled from a show/hide option in the View menu. If a separate tool palette is used, it is accessed from the menu bar in the map window; the dialog window containing the palette can be positioned as desired (e.g., adjacent to the map area) and closed when no longer needed.

Map area. The map area consists of a series of layers containing a map background and one or more overlays. The map background includes of the map itself and may also include features such as country boundaries, cities, rivers, and bridges that are attributes of the map. Each overlay contains a collection of map objects specified by the user. These objects include (a) tactical symbology representing entities such as ships, aircraft, or equipment, (b) user-defined map features, (c) tactical graphics such as points of interest, fortified areas, and minefields, and (d) drawn graphics such as circles, rectangles, and lines.

The map is the background layer in the map display space, with individual overlays arrayed above it, as shown in figure 10-2. The pointer is always the topmost layer and cannot be obscured by the objects at any layer or by a pop-up menu when one is displayed. Users can configure overlay layers and their contents and manipulate them in relation to the map background. The map space as a whole, the map background, and individual overlays and objects each possess characteristics that define what it is (i.e., properties), how it behaves (i.e., operations), and how it is influenced by other objects (i.e., relationships). Users can define and manipulate these characteristics from a pop-up menu available for each object.

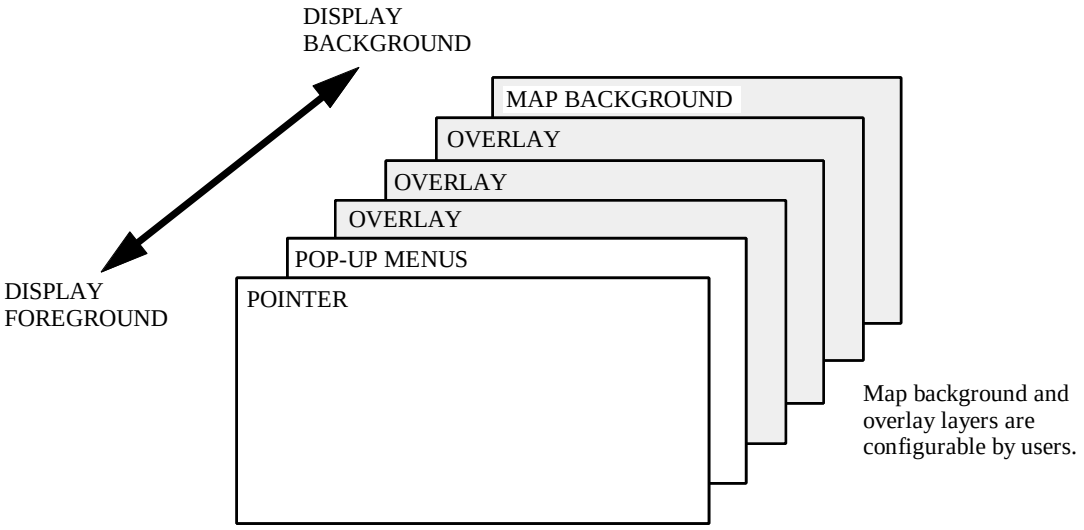


Figure 10-2. Representation of the map information space.

Status bar. The status bar presents map messages (e.g., feedback during map redraw) to the user and displays map information such as map center, coordinates, and width. The status bar can also display the coordinates of the pointer position when it is on the map. The status bar complies with specifications in section 8.1.4, with specific contents and format tailored as needed by the application.

## 10.2 Displaying and Interacting With Map Information

This section identifies the set of default map functions that are expected to be available in a map window; it is assumed that the application will select from this set and define extensions (e.g., in terms of map accessories) as needed to meet mission requirements.

### 10.2.1 Map Display and Manipulation

Users can select the default map or a saved map to view in the map area. The application can define the default map, or it can be one designated by users. Users can identify a saved map by name, area covered, or attributes. The application includes identifying information (e.g., map name, area, projection, scale) with the map when it is displayed in the window (e.g., as part of the window title, in the status bar, or from a button in the tool area that presents the information in a separate window).

The application displays each map in the same orientation (north-oriented is the default). Users can change the orientation and display an annotation of orientation on the map if desired. Users can select the map features to be rendered and specify the draw rules (e.g., colors, labels) for these features. If appropriate, users can create special (i.e., user-defined) features and specify their placement and appearance.

The application provides a continuous coordinate indicator of the pointer location on the map (e.g., in the status bar of the window). The coordinates are updated as the user moves the pointer on the map and are expressed at a level of precision and in a coordinate system specified by the user. The application makes various map reading tools available so that users can perform pointer-based queries (e.g., to identify coordinates and elevation, determine distance and bearing between points on the map). Users can enter latitude and longitude to the level of accuracy needed; when calculations such as range, bearing, and position are performed, the answer computed reflects the degree of accuracy appropriate to the scale of the map displayed.

The application supports multiple methods for changing the map view. Users can set or reset the map center and width by entering the coordinates or clicking directly on the map. Users can select the unit of measurement and/or scale for entering these values. Users can zoom the map by entering the coordinates, clicking directly on the map, or drawing a box on the area to be zoomed. Users can enter the zoom factor or select a preset value. Zooming changes the size of background map features but does not affect the size of tactical symbology. Users can pan the map continuously and/or in jumps based on screen distance, geographic distance, or a percentage value.

Users can define a baseline (i.e., home) position on a map and return to this position quickly (e.g., by selecting a toolbar button). If desired, users can display a reference map (e.g., in a dialog window) that shows a miniature view of the full map and identifies the portion currently visible in the map area. The reference map is updated whenever users change the map view.

The application provides an overlay manager that allows users to show/hide each overlay (i.e., identify the ones that are “visible”), configure the order in which overlays are displayed, and indicate the one to be active (i.e., on top). If appropriate, users can adjust the intensity of the map background to “fade out” selected map features so that map symbols and graphics are easier to see. Users can send the contents of an overlay in a message to other locations and enable overlay sharing if they have authorization to do so. Access to an overlay by other users can be global (i.e., available to all users), shared (i.e., available to a subset of users), or personal (i.e., available to a single user).

### 10.2.2 Interaction With Map Objects

A map object is defined by its outside boundary. If a label is displayed with the object, the label is considered part of the object. A map object is plotted so that its geometric center is at the actual location of the object. If an object is offset, it is connected to its actual location using lines, arrows, or other graphics. The views of a map object are linked across all windows that display information about the object. For example, when users select the name of a map feature from a list in a dialog window, the graphic for that feature on the map also highlights.

Users interact with map objects following Motif and MS Windows rules and conventions as described in section 3.0.

- Users place the pointer on a map object and click BLeft to select it. The object highlights (e.g., changes color, displays "handles") to indicate its select state, and it moves to the foreground so that it is not obscured by other objects.

- Users place the pointer on a map object and double click BLeft to open or view its contents. For example, double clicking on a track object displays a window with information about the track, and double clicking on a graphic object displays a window with information about the graphic (e.g., the overlay that "owns" it, the date created).

- Users place the pointer on a map object and click BRight to display a pop-up menu listing properties and operations for the object. For example, the pop-up menu for a track object might contain a "Readiness data" option that executes a query against the appropriate database and displays these data for the object; the pop-up menu for a graphic object might contain options for editing the object (e.g., Cut, Copy, Paste). Users can select multiple map objects, then click BRight to display a pop-up menu with options that apply to all of the objects in the selection.

Users can interact with individual map objects as well as perform operations on the collection of objects in an overlay. Each overlay is assumed to be "transparent" except where an object is present. As a result, users can select any "visible" object on which they can place the pointer (i.e., is not obscured by another object). Users are able to interact with an object that is hidden by another object by performing a "drill-down" selection. In this case, users place the pointer over the obscured object and "query" that point within the map space. A pop-up menu listing all objects that intersect the pointer is displayed from which users can select the object of interest.

The application can allow users to specify the frequency and rate at which information about map objects is updated and to temporarily stop and then resume auto-updating. The application can also allow users to share map objects. An object can be defined as global, shared, or personal. Users can create, edit, and delete personal objects and can perform these actions on global and shared objects if they have authorization to do so.

### 10.2.3 Tactical Symbology and Graphics

The tactical symbology and graphics displayed by the application conform with applicable military standards. MIL-STD 2525A defines common warfighting symbology for use by all C4I systems in DoD.[1] An application with requirements in a specific operational domain complies with all relevant national and international symbology standards. If the application creates new symbology, it does so in ways that are consistent with applicable standards.

At a minimum, the application displays the tactical symbology set contained in MIL-STD 2525A; if the application supports additional symbol sets, users are able to select among them and identify the one currently in use (e.g., as part of the identifying information in the status bar). Users can configure the symbol features to be displayed based on user-specified criteria (e.g., by affiliation and/or battle dimension). These features include the symbol attributes (e.g., frame, fill, icon), appearance (color/monochrome, frame/text color), and size (small, medium, large) and whether graphic and/or text modifiers are displayed with the symbols. If appropriate, users are allowed to create and display system-unique symbols and add special (i.e., user-defined) extensions that override default symbol features.

The application displays the tactical graphics in MIL-STD 2525A and other domain-specific graphics (e.g., weather) as appropriate. Users can configure the appearance of the graphics (e.g., size, color), specify the position (e.g., lat/long coordinates) where the graphics are placed, and select the text modifiers to include with the graphics. Users also have access to a palette of drawing tools for creating and placing user-defined graphics (e.g., line, polyline, circle, rectangle, freeform, text) on the map. Users can define the attributes (e.g., line type, thickness, color; text font, style, size, color; fill pattern, color) of the object being drawn and specify whether placement is to be fixed (i.e., attached to specific coordinates) or dynamic (i.e., attached to another map object so that the graphic moves with the object). Users can draw these objects directly on the map or enter the parameters that define their size and placement (e.g., enter the lat/long coordinates for the center of a circle and the length of the radius).

The application provides users with the capability to declutter the map space and to select objects in a cluttered environment. Tools for reducing visual clutter include (1) offsetting the placement of objects from their actual location, (2) repositioning labels so that they are not obscured by other objects, with a line connecting each label to its object, and (3) supporting variable coding of objects (i.e., high-interest objects are rendered as symbols and low-interest objects as dots). To select objects in a cluttered environment, users can perform drill-down selection of obscured objects or select from a pop-up list of objects in the current selection.

### 10.2.4 Coding Tactical Information

If the application uses color to impart tactical meaning, each category of tactical data is represented by a different color. Color serves as a redundant code with another attribute of the

[1] The DoD style guide, which predates the publication of this MIL-STD, recommends that map graphic symbols conform with published standards such as NATO Standardization Agreement 2019 Military Symbols for Land-Based Systems, Army Field Manual 101-5-1 Operational Terms and Symbols, and the DIA Standard Military Graphics Symbols Manual.

object (e.g., size, shape, text) and is not the sole basis for coding. The colors selected to convey tactical meaning are used consistently throughout the application. If one of these colors is assigned another meaning, a different shade is selected so as to minimize the likelihood of confusion. If the application uses color to indicate threat status, it does so in accordance with applicable military standards (e.g., red represents a hostile threat). Section 12.3.1 provides additional direction on the use of color in information coding.

If the application uses color for the purpose of alerting, only the tactical information to which the application wants to direct user attention is assigned a unique color. A standard meaning in terms of alert criticality is assigned to each color, and that color is used consistently to convey this meaning. While alerting is usually indicated by assigning color to text information (e.g., in a list or table), colored icons can also be defined and appended to the information. Examples of how color might be applied as an alert indicator are provided below:

Vulnerability Time
Red = Vulnerable now
Yellow = Vulnerable in X minutes
Green = Vulnerable in Y minutes (where Y is greater than X)
Blue = Not vulnerable

Probability of Detection
Red = High probability (greater than X percent)
Yellow = Medium probability (less than X percent but greater than Y percent)
Green = Low probability (less than Y percent)

Confidence Factor
Red = Unknown
Yellow = Low
Green = High

Priority
Red = High
Yellow = Medium
Green = Low

Probability of Hostile Action
Red = Imminent
Yellow = Probable
Green = Possible
Blue = None

Action Items
Red = Now
Yellow = In X minutes
Green = No time limit
Blue = No action required